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The Phalacridae (Coleoptera, Cucujoidea) of Canada: new records, distribution, and bionomics with a particular focus on the Atlantic Canadian fauna

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Abstract

The Canadian Phalacridae are briefly surveyed. Two species, *Phalacrus politus* Melsheimer and *Olibrus vittatus* LeConte, are newly recorded in Canada. As a result, eight phalacrids are now known to occur in Canada. Thirteen new provincial records are reported including one from Saskatchewan, two from Manitoba, two from New Brunswick, three from Nova Scotia, two from Prince Edward Island, and three from Newfoundland and Labrador. The four species and ten provincial records of Phalacridae reported from provinces in Atlantic Canada are the first records of this family in the region. Information on the bionomics of these species is briefly summarized. The species include *Phalacrus penicillatus* Say, *Phalacrus politus* Melsheimer (a smut-feeding species associated with corn, sorghum, and other grasses), Olibrus vittatus LeConte, *Olibrus semistriatus* LeConte (an abundant floricolous species found in the heads of several genera of Asteraceae), *Acylomus pugetanus* Casey (an ergot-feeding beetle associated with various grains and wild grasses), and *Stilbus apicalis* (Melsheimer) (an apparently surface-feeding, mold-grazing, facultatively parthenogenic species). The discovery of *P. politus* on insular Newfoundland is particularly noteworthy and represents a range extension of about 1,260 km. The possible origins of this apparently isolated and disjunct population are discussed, focusing on the glacial history of the region.

Keywords

Coleoptera, Phalacridae, *Phalacrus*, *Olibrus*, *Acylomus*, *Stilbus*, *Litochropus*, Atlantic Canada, Canada, biodiversity, disjunct populations

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Introduction

The Phalacridae (the shining flower and mold beetles) is a poorly known family, badly in need of taxonomic revision. The last comprehensive treatment of the Nearctic fauna was by Casey (1916). There are 635 described species worldwide, of which 122 are found in North America (Gimmel, unpublished data). Of these only six species were reported in Canada by Campbell (1991), none of which were recorded from Atlantic Canada (New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island). Campbell (1991) characterized the Phalacridae and Ptiliidae as the two most poorly known families of beetles in Canada. Since that time Sörensson (2003) and Majka and Sörensson (2007) have surveyed the ptiliid fauna of Atlantic Canada and recorded many new species. Until now, there has been no commensurate study of the Phalacridae.

Methods and conventions

Codens (following Evenhuis 2007) of collections consulted in this study are:

ACNS Agriculture and Agri-food Canada, Kentville, Nova Scotia, Canada
ACPE Agriculture and Agri-food Canada, Charlottetown, Prince Edward Island, Canada
CBU Cape Breton University, Sydney, Nova Scotia, Canada
CFNL Canadian Forest Service, Corner Brook, Newfoundland, Canada
CGMC Christopher G. Majka collection, Halifax, Nova Scotia, Canada
DAL Dalhousie University, Halifax, Nova Scotia, Canada
DHWC David H. Webster collection, Kentville, Nova Scotia, Canada
GSC Gary Selig collection, Bridgewater, Nova Scotia, Canada
JCC Joyce Cook Collection, North Augusta, Ontario, Canada
JOC Jeffrey Ogden collection, Truro, Nova Scotia, Canada
MNHN Muséum National d'Histoire Naturelle, Paris, France
MUN Memorial University of Newfoundland collection, St. John's, Newfoundland, Canada (currently on long term loan to the Canadian Forest Service, Edmonton, Alberta)
NFRC Northern Forest Research Centre, Edmonton, Alberta, Canada
NSAC Nova Scotia Agricultural College, Bible Hill, Nova Scotia, Canada
NSMC Nova Scotia Museum, Halifax, Nova Scotia, Canada
NSNR Nova Scotia Department of Natural Resources, Shubenacadie, Nova Scotia, Canada
RWC Reginald Webster Collection, Charters Settlement, New Brunswick, Canada
UMNB Université de Moncton, Moncton, New Brunswick, Canada
UNH University of New Hampshire, Durham, New Hampshire, United States

The taxonomy and nomenclature follows Steiner (2002). Identification of specimens was done by employing the keys of Steiner (2002) to the level of genus, and then to the level of species by using the keys in Downie and Arnett (1996) and by comparisons with authoritatively identified type and non-type specimens.

Results

Eight species of Phalacridae are now known to occur in Canada (Table 1). Specific details follow.

Phalacrus penicillatus Say, 1824

MANITOBA: Division No. 7, Aweme, 16.VII.1917, N. Criddle (1, NFRC). **SASKATCHEWAN**: Division No. 8, Lancer Ferry, 30.VI.1975, (1, NFRC).

Phalacrus penicillatus is newly recorded from Manitoba and Saskatchewan. The species is a western North American one that has been recorded in the United States from Arizona, California, Idaho, Kansas, New Mexico, Nevada, Oregon, and Washington (LeConte 1856; Casey 1916; Snow 1906; Hatch 1962; Bechtel et al. 1983; Caterino 2006) and in Canada from British Columbia (Hatch 1962; Campbell 1991). No specific information on its biology is available, but it is probably associated with smuts like other species in the genus *Phalacrus*.

Table 1. A checklist of Canadian Phalacridae

	Distribution
Phalacrus penicillatus Say	BC, **MB**, **SK** / AZ, CA, CO, ID, KS, NM, NV, OR, WA
Phalacrus politus Melsheimer	**NF** / CT, FL, IN, LA, MA, ME, MI, MO, NC, NH, NY, RI, TN
Olibrus rufipes LeConte	BC / OR
Olibrus semistriatus LeConte	MB, **NB**, **NF**, **NS**, ON, **PE** / AZ, CO, IN, KS, NH, NY, PA, RI
Olibrus vittatus LeConte	**MB** / CO, FL, IL, LA, NM, NY, ND, SD
Acylomus pugetanus Casey	**LB**, MB, **NS**, ON, QC / AR, CT, DC, DE, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MT, NE, NH, NJ, NY, OH, OR, PA, SD, VA, VT, WA, WI, WV
Stilbus apicalis (Melsheimer)	BC, **NB**, **NS**, ON, **PE**, QC / CA, CT, FL, ID, IL, IN, KS, LA, MA, MD, ME, NH, NY, OR, PA, RI, WA, WV
Litochropus scalptus Casey	QC / DC, LA, MN, NC

Notes: Canadian jurisdictions are listed followed by those in the United States. Boldface entries signify new records reported in this paper. **Canada:** BC, British Columbia; LB, Labrador; MB, Manitoba; NB, New Brunswick; NF, insular Newfoundland; NS, Nova Scotia; ON, Ontario; QC, Québec; PE, Prince Edward Island; SK, Saskatchewan; **United States:** AZ, Arizona; CA, California; CO, Colorado; CT, Connecticut; DC, District of Columbia; DE, Delaware; FL, Florida; IA, Iowa; ID, Idaho; IL, Illinois; IN, Indiana; KS, Kansas; KY, Kentucky; LA, Louisiana; MA, Massachusetts; MD, Maryland; ME, Maine; MI, Michigan; MN, Minnesota; MO, Missouri; MT, Montana; NC, North Carolina; ND, North Dakota; NE, Nebraska; NH, New Hampshire; NJ, New Jersey; NM, New Mexico; NV, Nevada; NY, New York; OH, Ohio; OR, Oregon; PA, Pennsylvania; RI, Rhode Island; SD, South Dakota; TN, Tennessee; VA, Virginia; VT, Vermont; WA, Washington; WI, Wisconsin; WV, West Virginia.

Phalacrus politus Melsheimer, 1844

NEWFOUNDLAND: Terra Nova National Park, Salton Brook, 21.VI.1978, (15, MUN); Gander, 20.VI.1981, (1, MUN); South Pond, 27.VI.1980, Brennan and D. Larson, beaver pond, (1, MUN).

Phalacrus politus is newly recorded in Canada (Fig. 1). The species is widely distributed in the eastern United States from Maine south to Florida and west to Louisiana, Missouri, and Michigan (Casey 1916; Leng 1920; Leonard 1928; Downie and Arnett 1996; Chandler 2001; Gimmel 2008). Specimens of *Phalacrus politus* were reported on sorghum (*Sorghum bicolor* (L.) Moench, Poaceae) by Hayes (1920). Steiner (1984) found adults and larvae in the powdery galls of corn smut, *Ustilago maydis* (Dc.) Cda growing on corn, *Zea mays* L., and in an unidentified smut on the panic grass, *Panicum dichotomiflorum* Michx. (Poaceae). Specimens of *Phalacrus politus* have also been collected in western Maine [Augusta, 21.VIII.1943, A.E. Brower, (1, UNH); Brunswick, 17.IX.1939, A.E. Brower, (2, UNH); Gilead, 26.VIII.1956, A.E. Brower, (1, UNH); Lexington, 13.VII.1959, A.E. Brower, (1, UNH)].

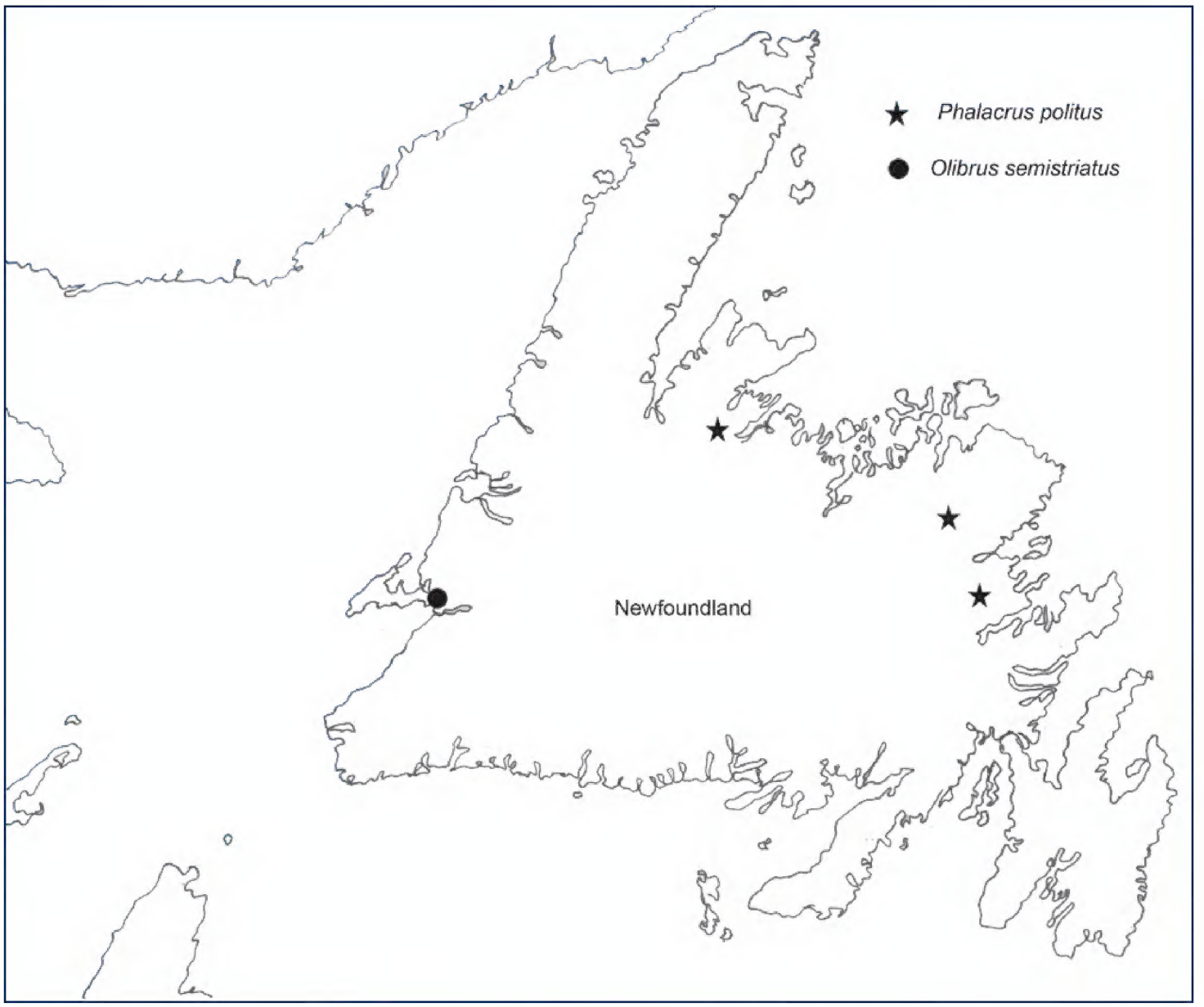

Fig. 1. Distribution of *Phalacrus politus* Melsheimer and *Olibrus semistriatus* LeConte in Newfoundland and Labrador.

Olibrus rufipes LeConte, 1856

Olibrus rufipes has been recorded in Canada from British Columbia (Campbell 1991). In the United States LeConte (1856) recorded it from Oregon. No specific information on its biology is available, however, all known larvae in the genus *Olibrus* live in flower heads of Compositae and the pollen-feeding adults are often abundant on these plants (Steiner 2002).

Olibrus semistriatus LeConte, 1856

NEW BRUNSWICK: Albert Co.: Albert Mines, 9.VII.2002, C.G. Majka, old field, (2, CGMC); Caledonia Mountain, 1965-1971, C.G. Majka, old field, (1, CGMC); Crooked Creek, 22.VIII.2003, C.G. Majka, floodplain, (1, CGMC); Mary's Point, 21.VIII.2003, 23.VIII.2003, 12.VIII.2004, C.G. Majka, seashore, (10, CGMC); **Charlotte Co.:** Deer Island, 9.V.1983, M.E.M. Smith, (7, ACPE); **Westmorland Co.:** Moncton, 15.IX.1978, A. Chenard, (1, UMNB). **NEWFOUNDLAND:** Stephenville, 14.VIII.1985, D. Larson, (1, MUN). **NOVA SCOTIA:** 171 specimens examined from Annapolis, Cape Breton, Colchester, Cumberland, Digby, Halifax, Inverness, Kings, Lunenburg, Pictou, Queens, Shelburne, Victoria, and Yarmouth counties. The earliest records are from 1945 [**Halifax Co.:** St. Margaret's Bay, 9.VIII.1945, 18.VIII.1945, D.C. Ferguson, (10, NSMC); **Kings Co.:** Grand Pre, 12.VIII.1945, D.C. Ferguson, (1, NSMC); Greenwich, 12.VIII.1945, D.C. Ferguson, (1, NSMC)]. **PRINCE EDWARD ISLAND: Kings Co.:** Launching, 26.VIII.2003, C.G. Majka, salt marsh on *Solidago sempervirens* L., (2, CGMC); Woodville Mills, 16.VIII.2002, C.G. Majka, shore of small pond, (4, CGMC); **Prince Co.:** Indian River, 4.IX.2001, C.G. Majka, coastal marsh, (6, CGMC); Lower Darnley, 25.VIII.2003, C.G. Majka, coastal dunes, (4, CGMC); Malpaque, 25.VIII.2003, C.G. Majka, coastal dunes, (1, CGMC); Summerside, 4.IX.2001, C.G. Majka, wet meadow, (6, CGMC); **Queens Co.:** Cavendish, 19.VII.2001, C.G. Majka, sea coast, (1, CGMC); Harrington, 19.VIII.1993, M.E.M. Smith, potato field, (1, ACPE); Millvale, 17.VIII.2002, 15.VIII.2004, 25.VI.2003, C.G. Majka, along river, (8, CGMC); New London Bay, 3.IX.2001, C.G. Majka, seashore on *Solidago sempervirens* L., (4, CGMC); North Rustico, 17.VIII.2002, C.G. Majka, coastal lagoon, (3, CGMC); Pinette, 24.VI.2003, C.G. Majka, seashore, (1, CGMC); Toronto, 19.VIII.2002, C.G. Majka, old field, (1, CGMC); Wood Islands, 23.VII.2001, 6.IX.2001, 20.VIII.2002, 29.VIII.2003, C.G. Majka, seashore, (8, CGMC).

Olibrus semistriatus is newly recorded in New Brunswick, Newfoundland, Nova Scotia, and Prince Edward Island (Figs. 1, 2). The species has previously been recorded from New Hampshire south to Pennsylvania and west through Ontario, Indiana, and Kansas to Manitoba, Colorado and Arizona (LeConte 1856; Gibson 1917; Campbell 1991; Downie and Arnett 1996; Chandler 2001; Goertz 2006). The larvae of *Olibrus* species live in the flower heads of species of Asteraceae in genera such as *Ageratina*, *Aster, Bidens, Cirsium, Chrysopsis, Eupatorium, Solidago*, and *Vernonia,*

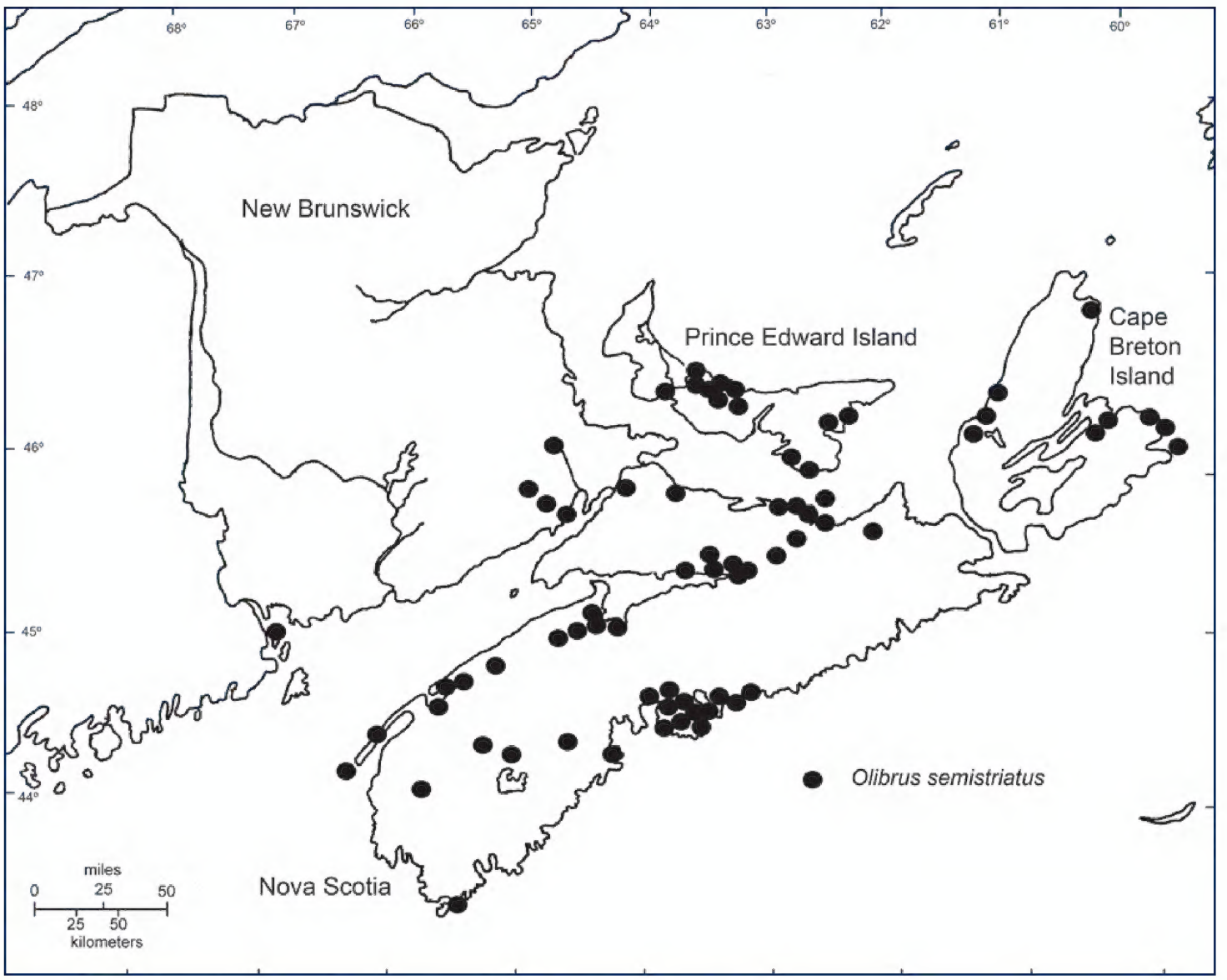

Fig. 2. Distribution of *Olibrus semistriatus* LeConte in New Brunswick, Nova Scotia, and Prince Edward Island.

and the pollen-feeding adults are often abundant on these plants (Lawrence 1991; Steiner 2002). In Nova Scotia specimens have been collected on *Achillea millefolium* L., *Aster novi-belgii* L., *Solidago canadensis* L., and *Solidago rugosa* Ait. (Asteraceae). Adults have also occasionally been found on other flowers such as *Verbascum thapsus* L. (Scrophulariaceae) and *Rosa rugosa* Thunb. (Rosaceae). In New Brunswick and Prince Edward Island soecimens have frequently been collected in coastal localities where they are abundant on *Solidago sempervirens* L.

Olibrus vittatus LeConte, 1863

MANITOBA: Division No. 7, Aweme, 7.VIII.1915, N. Criddle (1, NFRC).

Olibrus vittatus is newly recorded in Canada. The species has previously been recorded in the United States from Colorado, Florida, Illinois, Louisiana, New Mexico, New York, North Dakota, and South Dakota (Snow 1881-1882; Casey 1916; Downie and Arnett 1996; Peck and Thomas 1998; Goertz 2006; Gimmel 2008). No specific information on its biology is available, however, larvae in the genus *Olibrus* live in flower heads of Compositae and the pollen-feeding adults are often abundant of these plants (Steiner 2002).

Acylomus pugetanus Casey, 1916

NEWFOUNDLAND: Labrador (Guillebeau 1894; see note below). **NOVA SCOTIA: Colchester Co.:** Bible Hill, 19.VII.2005, A. Mills, pasture, (1, DAL); Bible Hill, 10.VI.2004, 22.VII.2004, 5.VIII.2004, 31.V.2005, K. Aikens, pasture, (4, CBU); Bible Hill, 18.VIII.2005, S.M. Townsend, pasture, (1, CBU); Truro, no date or collector information, (1, NSAC); **Cumberland Co.:** Westchester-Londonderry, 20.VII.1992, S. and J. Peck, forest road, car net, (7, JCC); **Guysborough Co.:** Trafalgar, 19.VII.1992, S. and J. Peck, car net, (15, JCC); **Halifax Co.:** Upper Tantallon, 17.VII.1992, S. and J. Peck, car net, (1, JCC); **Queens Co.:** Medway River, 13.VII.1993, J. and T. Cook, car net, (3, JCC); **Shelburne Co.:** Clyde River Rd., 16.VII.1992, J. and T. Cook, forest, car net, (7, JCC); Sebim Beach, 19.vii, 1993, J. and T. Cook, (1, JCC); **Yarmouth Co.:** Carleton, Perry Rd., 22.VIII.1992, 18.VII.1993, J. and T. Cook, car net, (2, JCC); Quinlan, Coldstream Rd., 19.VII.1993, J. and T. Cook, car net, (1, JCC).

Acylomus pugetanus is newly recorded in Atlantic Canada (Fig. 3). In Canada it has previously been recorded from Manitoba east to Québec (Campbell 1991) and

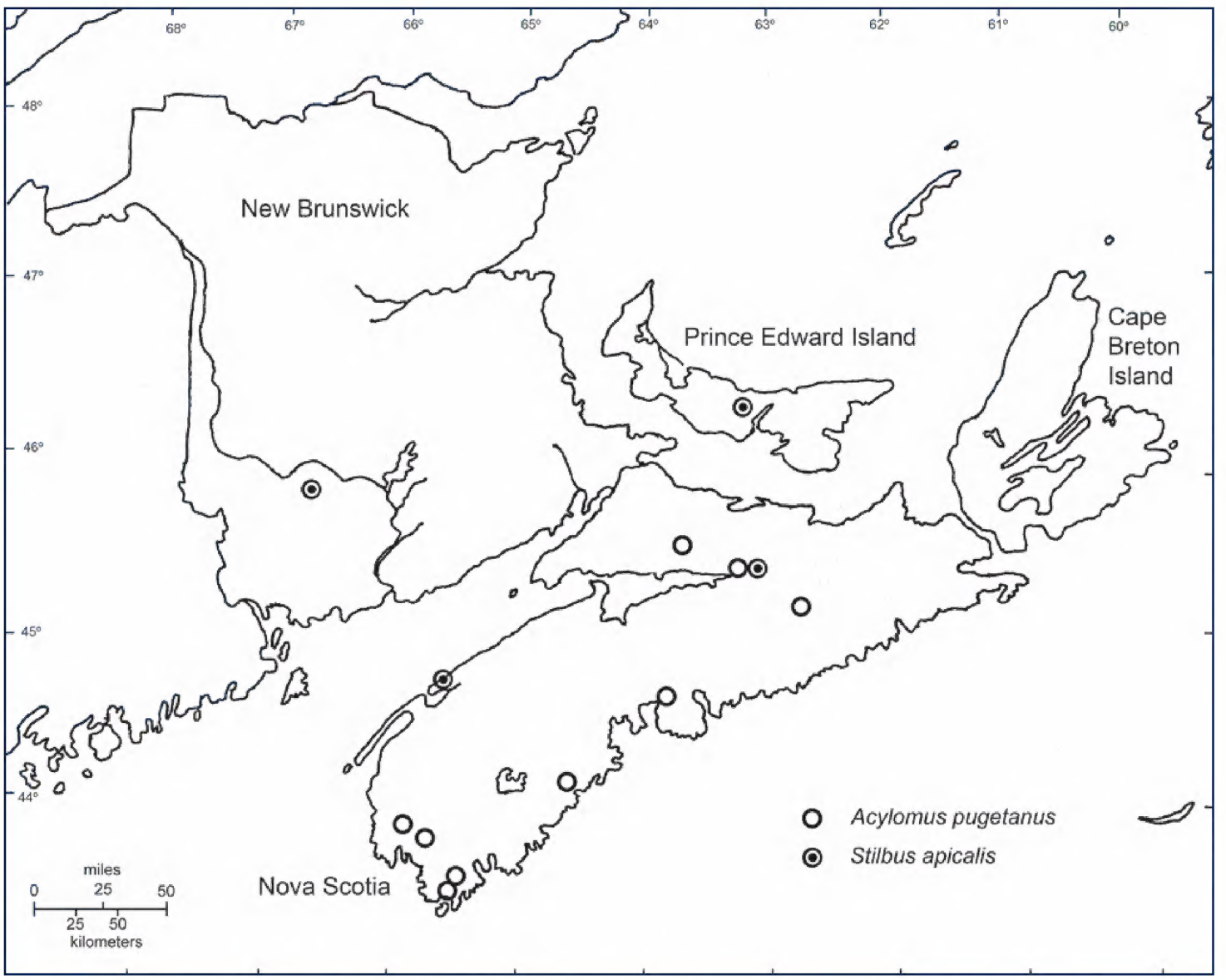

Fig. 3. Distribution of *Acylomus pugetanus* Casey and *Stilbus apicalis* (Melsheimer) in New Brunswick, Nova Scotia, and Prince Edward Island. **Note:** the Labrador record of *A. pugetanus* is not indicated.

in the United States from Maine and Washington state south to Virginia, Arkansas, Utah, and Oregon (Steiner and Singh 1987). Adults and larvae of *A. pugetanus* feed on the sclerotia of ergot fungi (*Claviceps* spp., Clavicipitaceae) found growing on grains and wild grasses such as wheat (*Triticum aestivum* L.), rye (*Secale cereale* L.), quack grass (*Agropyron repens* (L.) Beauv.), meadow fescue (*Festuca pratensis* Huds.), and salt-meadow grass (*Spartina patens* (Ait.) Muhl.) (Poaceae) (Steiner and Singh 1987). Consequently they occur in open habitats where such grasses grow. In Nova Scotia many specimens have been collected in pastures. There has been some interest in this species in relation to agriculture, both as a potential biocontrol agent of ergot, as well as a potential vector of the disease (Steiner and Singh 1987). The many specimens collected by car nets in Nova Scotia indicate that they fly well and actively disperses aerially. This species has not been recorded in New Brunswick but in all probability occurs there.

Note: based on a single specimen, Guillebeau (1894) described *Eustilbus borealis*, whose type locality is "Labrador." Matthew Gimmel has examined this specimen (MNHN) and it is an *Acylomus*, almost certainly *A. pugetanus*. Matthew Gimmel is presently working on a revision of the Phalacridae of North America, and the nomenclatural issue that this specimen raises will be addressed in the context of this larger revision.

Stilbus apicalis (Melsheimer, 1844)

NEW BRUNSWICK: York Co.: New Maryland, 45.83°N 66.73°W, 26.VI.2003, R.P. Webster, mixed forest, at light, (1, RWC). **NOVA SCOTIA: Annapolis Co.:** 19.VI.1995, J. Ogden, (1, NSNR); **Colchester Co.:** Bible Hill, 5.VIII.2004, 14.V.2005, 23.V.2005, 31.V.2005, K. Aikens, pasture, sweep net, (12, CBU). **PRINCE EDWARD ISLAND: Queens Co.:** Harrington, 2.IX.2005, 8.IX.2005, M.E.M. Smith, barley fields, sweep net, (10, ACPE).

Stilbus apicalis is newly recorded in Atlantic Canada (Fig. 3). The species has previously been recorded in eastern North America from Ontario and Maine, south to Florida, and west to Louisiana, Kansas, and Illinois; and in the west from British Columbia south through Idaho to California (Leng 1920; Campbell 1991; Downie and Arnett 1996; Chandler 2001; Gimmel 2008). Little is known about its bionomics except that individuals have been collected by sweeping grasses (Steiner 1984), a habitat and collection mode consistent with most of the specimens collected in Atlantic Canada. Specimens are also commonly collected at lights (White 1983). Dearborn and Donahue (1993) reported individuals from spruce (*Picea* sp.) in Chesuncook and Augusta, Maine. Steiner (1984) noted that populations are almost exclusively comprised of females, and considered that it is likely a surface feeding, mold grazing, facultatively parthenogenic species. The precise hosts of *S. apicalis* are unknown although some adults were found on an unidentified smut growing on panic grass, *P. dichotomiflorum* (Steiner 1984).

Litochropus scalptus Casey, 1890

Litochropus scalptus has been recorded in Canada from Québec (Campbell 1991) and in the United States from the District of Columbia, Louisiana, Minnesota, and North Carolina (Leng 1920; Haarstad 2002; Gimmel 2008). Adults and larvae of the genus *Litochropus* have been reared and collected from fruiting bodies of *Daldinia* (Ascomycota: Xylariaceae) (Steiner 1984).

Discussion

Two species of phalacrids, *Phalacrus politus* and *Olibrus vittatus*, are newly recorded in Canada increasing the known Canadian fauna to eight species. Thirteen new provincial records are reported including one from Saskatchewan, two from Manitoba, two from New Brunswick, three from Nova Scotia, two from Prince Edward Island, and three from Newfoundland and Labrador.

Although previously unrecorded in Atlantic Canada, the family is now known to occur throughout the region (Table 2). Four species are found in Atlantic Canada and ten new provincial records are reported from the region. The pollen feeding species, *Olibrus semistriatus,* is abundant and is widely distributed in the region. *Phalacrus politus*, another species found on flower heads, has been recorded from insular Newfoundland. *Stilbus apicalis*, a poorly known, apparent mold-grazing species, is apparently much less abundant but has been found in widely distributed sites in the Maritime Provinces. *Acylomus pugetanus*, an ergot-feeding phalacrid found in open grassland environments, is widely distributed in Nova Scotia and has been recorded from Labrador. *Litochropus scalptus* has been found in Québec (Campbell 1991) and should be sought in western regions of New Brunswick.

The discovery of *Phalacrus politus* in Newfoundland, the first report of this species in Canada, is particularly noteworthy given that the nearest previous records are from western Maine. Thus the Newfoundland record represents a range extension of about 1,250 km. It is possible that *P. politus* does occur in intervening areas and simply has

Table 2. The Phalacridae of Atlantic Canada

	NB	NS	PE	NF	LB
Phalacrus politus Melsheimer				1	
Olibrus semistriatus LeConte	4	14	3	1	
Acylomus pugetanus Casey		7			1
Stilbus apicalis (Melsheimer)	1	2	1		

Notes: NB, New Brunswick; PE, Prince Edward Island; LB, Labrador; NS, Nova Scotia; NF, insular Newfoundland. Numbers indicate the number of county records. There are 15 counties in New Brunswick, 18 in Nova Scotia, and 3 on Prince Edward Island. County divisions are not employed in the province of Newfoundland and Labrador so numbers from there simply indicate the presence of species.

not been recorded to date, however, this seems improbable given that the substantial collecting effort for grassland dwelling Coleoptera in the Maritime Provinces. With the apparently large distribution gap, and Newfoundland's position as an island over 100 km distant from the nearest point of continental Nova Scotia, the presence of *P. politus* raises some intriguing zoogeographic questions.

Hamilton and Langor (1987) reported similar disjunct distributions for endemic and relict species of leafhoppers in insular Newfoundland including species such as *Idiocerus subnitens* Sanders and DeLong (found in New England north to Vermont) and *Empoasca coccinea* Fitch (found north to Maine). While the Nova Scotia shelf was completely covered by ice during the maximum extent of the Wisconsinan glaciation (King 1996), Hamilton and Langor (1987) postulated that an unglaciated refugium on the St. Pierre banks south of Newfoundland resulted in the post-glacial disjunct distribution of these species. As well, there is evidence for nunataks (unglaciated hill crests) in Newfoundland (Grant 1989). Such glacial refugia are postulated to have been the sites for the survival and/or evolution of the endemic and relict leafhopper faunas found in Newfoundland and Cape Breton Island. *Phalacrus politus* could potentially be a member of this suite of insects that survived the Wisconsinan glaciation in such sites, subsequently re-colonizing Newfoundland after it retreat circa 18,000 years B.P.

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